

REMARKS

The applicants appreciate the Examiner's thorough examination of the application and requests reexamination and reconsideration of the application in view of the preceding amendments and the following remarks.

The Examiner rejects claims 1-4, 8-17, 19-20, 22-23, 30, 34-43, 45-46 and 48-49 under 35 USC § 102(b) as being anticipated by German Patent No. 3,819,566 (DE '566) and rejects claims 5-7 and 31-33 under 35 USC § 103(a) as being unpatentable over DE '566.

The applicant's invention is directed to a rotary seal assembly comprising a first member having a sealing face, a second member having a sealing face with a number of pumping grooves therein, at least a first set of pumping grooves starting proximate a center portion of the sealing face of the second member and extending outward towards the outer diameter of the second member and at least a second set of pumping grooves starting proximate the center portion of the sealing face of the second member and extending inward towards the inner diameter of the second member to direct fluid fed to the center portion of the sealing face simultaneously both inwardly and outwardly from the center portion of the sealing face of the second member to provide a uniform fluid film thickness between the sealing faces of the first and second members when one sealing face cones due to thermal and/or pressure effects, and a feeding groove for providing fluid to the center portion of the sealing face of the second member, the feeding groove being discontinuous forming a number of feeding groove sections.

To advance the prosecution of the subject application, the applicant has amended claim 1 to include the features of original claim 5. Specifically, amended claim 1 now

includes that the feeding groove is discontinuous forming a number of feeding groove sections. As noted by the Examiner at paragraph 5 of the prior Office Action issued in this case, DE '566 fails to disclose that the feeding groove is discontinuous forming a number of feeding groove sections. The Examiner alleges that this feature is merely a design choice, and thus, it would have been obvious for one of ordinary skill in the art to modify the feeding groove as a matter of design choice.

However, the discontinuous feeding groove is not merely a design choice. In order to have a uniform film, the stator not only must conform to the coning of the rotor, it also must conform to the circumferential waviness of the rotor face. The discontinuous feeding groove serves to localize the supply of source fluid so that additional local film stiffness can be generated if the coning and waviness varies circumferentially. This enables the fluid film thickness to be uniformly formed in both radial and circumferential directions. For these reasons, the applicant's discontinuous feeding groove is not merely a design choice.

Accordingly, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify DE '566 to include the discontinuous feeding groove. Therefore, independent claim 1 and its associated dependant claims, are patentable over DE '566.

Independent claim 30 of the present application is directed to a rotary seal assembly comprising a first member having a sealing face with feeding orifices therein; and a second member having a sealing face with a number of pumping grooves therein, at least a first set of pumping grooves starting proximate a center portion of the sealing face of the second member and extending outward towards the outer diameter of the second member and at

least a second set of pumping grooves starting proximate the center portion of the sealing face of the second member and extending inward towards the inner diameter of the second member to direct fluid fed to the center portion of the sealing face of the second member by the feeding orifices of the first member simultaneously both inwardly and outwardly from the center portion of the sealing face of the second member to provide a uniform fluid film thickness between the sealing faces of the first and second members when one sealing face cones due to thermal and/or pressure effects.

DE '566 fails to disclose feeding orifices on a first member, and the pumping grooves on a second member as claimed by the applicant. DE '566 discloses that "formed in the region of the spiral grooves 18, 19 is an annular groove 20 which can be supplied with sealing gas and feeds it to the spiral grooves". Translated Abstract of DE '566; see also Fig. 2 of DE '566. It is clear that only discloses the spiral grooves and feeding groove on the same member. DE '566 fails to disclose the feeding orifices on one member and the pumping grooves on the other member as claimed by the applicant.

Accordingly, independent claim 30 and its associated dependant claims are patentable over DE '566.

The Examiner rejects claims 1-4, 8-9, 11-20, 22-23, 30, 34-35, 37-46 and 48-49 under USC § 102(e) as being anticipated by U.S. Patent No. 6,213,473 to *Lebeck* and claims 21, 24-25, 47, and 50-51 under 35 USC § 103(a) as being unpatentable over *Lebeck*. *Lebeck* is directed to a double gas seal with coplanar pad faces. However, *Lebeck* fails to disclose all of the elements of the claimed invention. Specifically, *Lebeck* fails to disclose a first set of pumping grooves extending outward towards the outer diameter of the second member and a second set of pumping grooves extending inward

towards the inner diameter of the second member, as claimed in amended independent claims 1 and 30.

The pumping grooves 94, 96 of *Lebeck* are circumferentially spaced. See Col. 5, lines 61-64 and Figs. 4 and 5 of *Lebeck*. *Lebeck* clearly discloses that pumping grooves run with the circumference of the rotor 40. However, the pumping grooves of the present invention extend inward towards the inner diameter of the second member and outward towards the outer diameter of the second member. This difference can be clearly seen in comparing/contrasting Fig. 3 of the subject application with Figs. 4 and 5 of *Lebeck*.

Accordingly, as *Lebeck* fails to disclose a first set of pumping grooves extending outward towards the outer diameter of the second member and a second set of pumping grooves extending inward towards the inner diameter of the second member as claimed by the applicant, independent claims 1 and 30, and their respective dependant claims are patentable over *Lebeck*.

The Examiner rejects claims 26, 28, 52 and 54 under USC § 103 (a) as being unpatentable over *Lebeck* in view of U.S. Patent No. 3,751,045 to *Lindeboom*. For at least the reasons set forth above, independent claims 1 and 30 are patentable over *Lebeck*. Dependent claims 26, 28, 52 and 54 are also patentable over *Lebeck* for at least those reasons. Accordingly, claims 26, 28, 52 and 54 are patentable over *Lebeck* in view of *Lindeboom*.

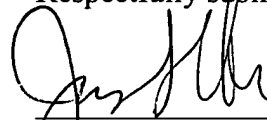
The Examiner rejects claims 1, 29-30 and 55-75 under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 5,609,342 to *Peterson* in view of *Lebeck* and claims 76 and 78 under 35 USC § 103(a) as being unpatentable over *Peterson* in view of *Lebeck*, and further in view of *Lindeboom*. The Examiner states that *Peterson* discloses a rotary

face seal assembly comprising a stator having a sealing face and a rotor having a sealing face. The Examiner notes that *Peterson* does not disclose grooves which are partitioned into first and second sections. Nor does *Peterson* disclose a first set of pumping grooves starting proximate a center portion of the sealing face and extending outward towards the outer diameter of the second member and at least a second set of pumping grooves starting proximate the center portion of the sealing face and extending inward towards the inner diameter of the second member. As stated above, *Lebeck* also fails to disclose this feature. Accordingly, independent claims 1, 30 and 56, and dependant claims 29, 55 and 57-78 are patentable over *Peterson* in view of *Lebeck*.

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Preliminary Amendment is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, (781)890-5678.

Respectfully submitted,



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